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X-ray Flashes Come Out of the Blue

A collaboration of telescopes reveals that mysterious x-ray flashes originate in blue, star-forming galaxies.

by Jessa Forte Netting



**Like gamma-ray
bursts, x-ray
flashes are
quick and
appear
randomly
across the sky.**
ESA / ECF

Long ago, in a **galaxy** far, far away... massive stars exploded and produced flashes of **x rays**. Or were they gamma-ray bursts? Maybe both, and maybe not so far away....

According to recent findings, gamma-ray bursts appear to herald the deaths of massive stars — a sudden pulse of energy that acts as a kind of cosmic death rattle. Sometimes, lower-energy x rays beam toward us in similar, brief pulses, dubbed x-ray flashes. But the origin of x-ray flashes has eluded cosmologists. One theory suggested they were actually ancient gamma-ray bursts, created in the early **universe** and stretched to longer-**wavelength** x rays by the expanding universe.

Now a team of astronomers using several types of telescopes in tandem has put that theory to rest. X-ray flashes, the group found, originate not in the tumult of the universe's beginnings, but much closer to home in blue, **star-forming** galaxies. Headed by Joshua Bloom of the Harvard-Smithsonian Center for **Astrophysics**, the team presented its results last week at the 2003 Gamma Ray Burst Conference in Santa Fe, New Mexico.

During the past two years, Bloom and his colleagues used the Chandra X-ray Observatory to study two x-ray flashes discovered by the now-



**BeppoSAX
discovered the
two x-ray
flashes studied
by Bloom's
team.**
*Italian Space
Agency /*

defunct BeppoSAX [satellite](#). They also used the Very Large Array (VLA) in New Mexico to study the radio afterglows of the x-ray flashes. Chandra and the VLA provided exact locations for the flashes, which the [Hubble Space Telescope](#) used to identify and study the flashes' host galaxies. Hubble's observations revealed the flashes came from blue, star-forming galaxies between several [billion](#) light-years away.

Rather than x-ray flashes being stretched-out [gamma rays](#), Bloom's team suggests that gamma-ray bursts and x-ray flashes may be different products of the same phenomenon: the explosion of a massive star.

We may simply see the same thing from slightly different angles, explains team member Derek Fox of the California Institute of Technology. If, from Earth, we happen to look right at one pole of the former star, we may see a torrent of gamma rays shooting directly out at us. Viewed at a slight angle to the same, perhaps instead we detect the weaker x rays, released in a wide, diffuse cone.

Or maybe an intrinsic property of the star determines whether it produces x rays or gamma rays. "There is some parameter, some dial that you twiddle, that causes the result to be one thing or the other," Fox suggests. A more massive stellar envelope, for example, could slow ejected material as it plows through these heavy gas layers surrounding a star, producing lower energy waves.

Now that the source of x-ray flashes has been identified, the new hunt will be to uncover whether there is such a link between these flashes and gamma-ray bursts and to find out what causes us to see one or the other.

*BeppoSAX
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Chandra studied the x-ray glow of the flashes.
NASA



The VLA observed the flashes' radio afterglow.
D. Finley / NRAO / AUI



Hubble identified the source of the x-ray flashes.
NASA

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